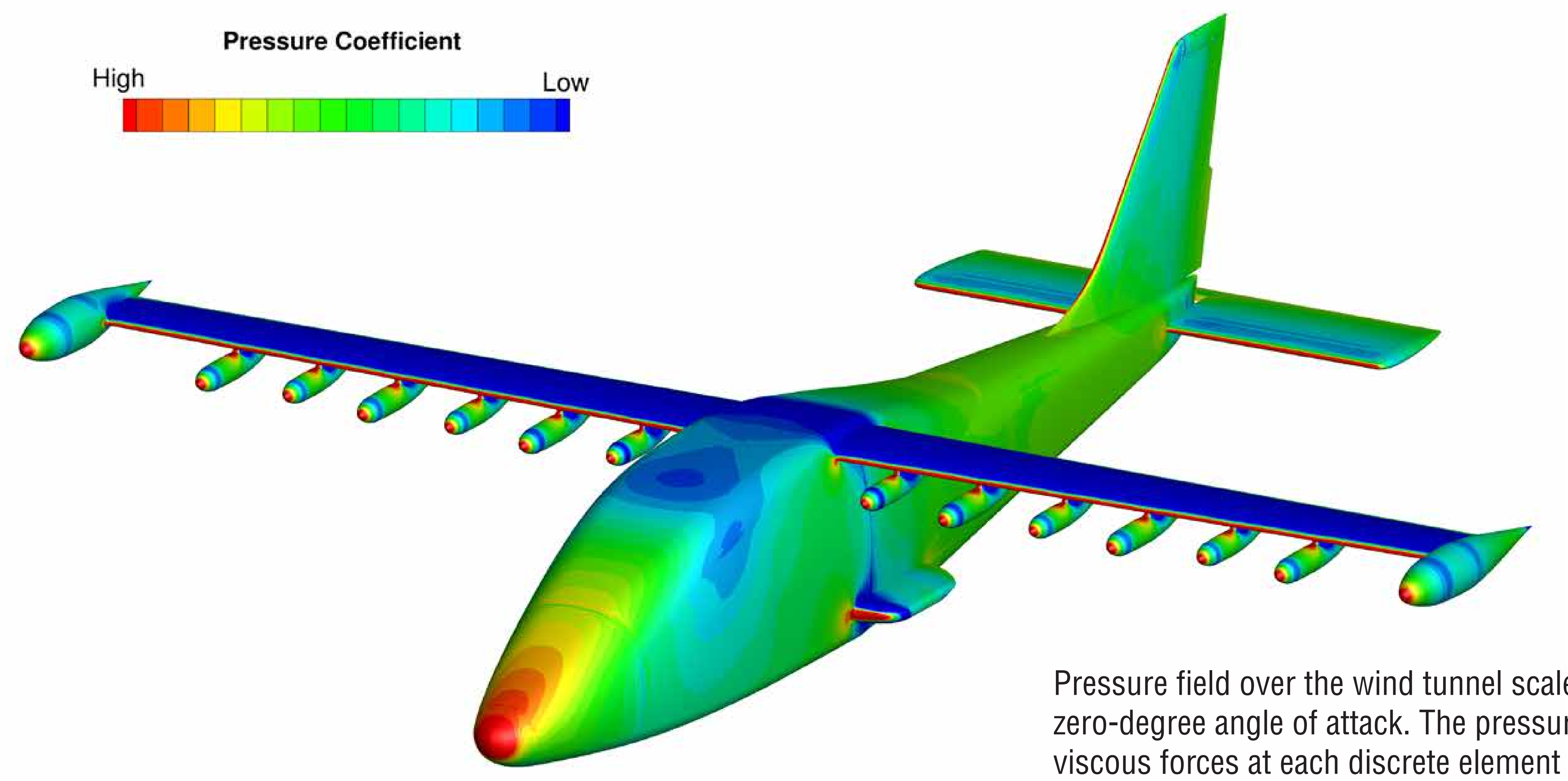
National Aeronautics and
Space Administration

A 19% scale model of the X-57 Modification III design with nominal control surface deflections inside the 12-ft. subsonic wind tunnel at NASA's Langley Research Center. Wind tunnel data was collected in 2015 for Mach 0.052 at sea-level ambient, which are the same conditions used in the simulation whose results are shown in the image below. This data was used as the experimental validation of the many simulation approaches studied in this project. *Gerald Lee Pollard, NASA/Langley; Michael Frederick, NASA/Armstrong*



Pressure field over the wind tunnel scale model at zero-degree angle of attack. The pressure and viscous forces at each discrete element are integrated over the entire aircraft to quantify lift, drag, side force, and the resulting aerodynamic moments. These quantities serve as the primary measure of solution variation caused by different codes, grids, and solver settings.
Jared Duensing, NASA/Ames

Simulating the X-57 Electric Concept Aircraft

Since its inception in 1946, the NASA X-plane series has yielded many conceptual designs that have addressed the most prominent challenges in flight. Today, the X-57 concept aircraft addresses the increased demand for energy-efficient and environmentally friendly solutions with its state-of-the-art distributed propulsion system. Analyzing this unique design requires high-quality computational grids and robust numerical algorithms that can handle its complex geometry, all of which can be studied under NASA's Launch Ascent and Vehicle Aerodynamics (LAVA) solver framework. With the help of supercomputing resources, it has been shown that this level of complexity is within LAVA's capability and that X-57 aerodynamic performance can be predicted accurately.

Jared Duensing, Cetin Kiris, NASA Ames Research Center